

Qualitative Analysis of Designing Interdependent E-Module for Type 2 Diabetes Mellitus Management: A Need of Analysis

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ABSTRACT

OBJECTIVE: To analyse the need to develop an interdependent e-module for t2dm management among caregivers and t2dm patients.

METHODOLOGY: Involving data collection through qualitative methods, document analysis, semi-structured interview analysis, and visual methodology among 30 respondents (21-60 years old) consisting of caregivers (n=15) and t2dm patients (n=15) at Hospital Sultanah Nurzahirah Kuala Terengganu, Malaysia as purposive sampling. Forty-five photos and interview content were compiled, discussed narratively, and coded using ATLAS.ti V9 software and Excel Spreadsheet for thematic analysis.

RESULTS: Six main themes were revealed based on the experience of the daily management of t2dm: (1) identify destructive conflict resolution strategies, (2) family-regulated for future safety, (3) empowered to take responsibility, (4) adaptive coping strategies, (5) stability to boosted health management, and (6) future family dynamic. These themes provide information on the requirements that must be present on the domains of the interdependent e-module for t2dm management.

CONCLUSION: This study provides insight into using needs analysis to create a more compelling experience designing interdependent e-modules. Therefore, extending this study to the development and implementation phases is appropriate.

KEYWORDS: Designing Interdependent E-Module, Caregiver, Type 2 Diabetes Mellitus Patients, Need of Analysis, Qualitative.

INTRODUCTION

Changes in time and the effects of the COVID-19 pandemic have had a significantly impacted the development of technological relationships, such as being able to connecting with individuals far away in a real-time setting¹.

Based on the current health education system, it is more practiced than the conventional method, which is face-to-face, which requires the patient and the next of kin of the patient to attend the health clinic for a family health education session. This situation is focused more on chronic diseases that require long-term treatment, such as type 2 diabetes mellitus (t2dm). T2dm is a non-communicable disease characterized by metabolic disorders that are difficult to control complications, and this problem is a significant public health issue in Malaysia^{2,3}. Emphasis on the early stage of diagnosis needs to be looked at deeply because the effects of complications, such as loss of individual ability function and high mortality, have seriously threatened the life and physical health of elderly patients later in life^{1,4}.

Despite the increasing emphasis on the importance of health education in improving the management of chronic diseases of the elderly in society, its implementation in actual practice is still insufficient.

Moreover, knowledge of the practice of action that needs to be recognized in the community is now high, but not the practice of action and the perception of risk exposure. At the same time, when health education was carried out to the community, the health personnel conducting targeted health education services using existing modules did not meet the needs and requirements of the targeted population. Health education modules that meet the criteria of therapeutic recommendations and needs can provide various self-management skills, understand the disease process, manage and respond appropriately to symptoms, and adapt to maintain quality of life in the future^{1,5,6}. However, this trend often changes and requires analysis to renew, follow the current trend, and support the problem's solution through health education interventions.

Needs analysis is the first analysis strategy to identify and determine the needs of a development to be carried out based on the problems that have been faced now^{7,8,9}. According to the study of Nababan and Saragih¹⁰, efficiency is a set of intelligent actions full of responsibility in carrying out a task. In comparison, Lamonge and Baua¹¹ stated that compliance is the key to success in managing diabetes, influenced by various factors. This is emphasised for the construction of the health module, and the previous needs analysis process should be re-analysed to reflect the latest needs in modules¹².

This study aims to perform the need analysis, designing an interdependent e-module for t2dm

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doi: 10.22442/jlumhs.2025.01339



management among caregivers and t2dm patients to design domains that meet their needs.

McKillip⁸ proposed three mode needs assessment models: the panty model, the marketing model, and the decision-making model. Different methods and techniques are used to ensure that the needs analysis finds gaps between what is currently done and what should be performed based on the actual guidelines^{7,9}. For this study, the researcher used the triangulation method to comprehensively understand the same phenomenon and simultaneously increase credibility and validity.

METHODOLOGY

Study Design

Qualitative methods were used for this study to explore the need for the interdependent e-module domain among caregivers and t2dm patients at Hospital Sultanah Nur Zahirah Kuala Terengganu (HSNZ KT). Qualitative methods are used instead of quantitative in order to obtain 'rich description' and 'natural and holistic' among the studied population to describe their macro and micro experiences¹³.

Population and Sample

For respondents who have met the inclusion criteria caregiver (18-60 years old, one person, cooperate, informal caregiver), and t2dm patient (25-60 years old, defaulted treatment and t2dm patient) as a purposive sampling of 15 families (N= 15) Caregiver/ N= 15 t2dm patients) as saturated reached and are registered under the HSNZ KT system.

Instrument

The researcher used a semi-structured interview protocol supplemented by a photo taken by the researcher himself to discuss^{14,15}. The open-ended questions were the same between respondents, in the form of probing questions involving the daily management of t2dm between caregiver and patient^{16,17}. The interview protocol was developed based on the literature review with the validity and reliability test was conducted. The Cohen Kappa Index (CKI) results of 0.71 and significant agreement of 0.035, based on Atman¹⁸, are acceptable and reasonable.

Document Analysis

In the first stage of the needs analysis, document analysis was done, which involved quality assurance statistical data of t2dm patients, the use of previous modules, an electronic document system, and documenting the clinical progress of t2dm patients. According to Bowen¹⁹, document analysis is a systematic procedure to review or re-evaluate documents through the selection of stable data availability in terms of authenticity rather than data collection. The steps consist of (1) preparing materials, (2) extracting data, (3) analysing data, and (4) filtering findings as coding to themes²⁰.

Semi Structure Interview Analysis

In the second stage, the researcher used a semi-

structured interview method on only one caregiver and a t2dm patient. This method needs to be done simultaneously between these two respondents for exploratory data to ensure that the data collected from the respondents is relevant and in-depth²¹. Open-ended questions are supplemented with probes and comments to explore thoughts and feelings and encourage reflection and beliefs about the questions posed²²⁻²⁴. This session took 30 minutes to 45 minutes for each family that met the inclusion criteria.

Visual Methodologies

This method as symbolic to supporting data from the semi-structured interview. Glaw et al.²⁵ stated that there are two methods in visual data collection: (1) auto photography and (2) photo elicitation. Both of these methods involve and encourage respondents to evoke feelings, reflect, explain, and anticipate the possible outcome of an event or the development of their lives through changes in the future¹⁵. The researcher-driven photo elicitation method was employed to gather insights into the risks and needs of the health e-module domain by analyzing experiences and perceptions^{24,26}.

Data Analysis

Data Collection Techniques

Once the respondents were identified, the researcher obtained consent from the caregiver and t2dm patient for this research activity. Respondents need to sign two consent forms, namely the interview form consent form and photo consent form. This study was conducted from December 2023 - February 2024. **Table I** shows how researchers stimulate discussion between photos and interview sessions.

Table I: Data Collection Techniques Using Photo and Interview

Photo Prompt:	(Show a photo of food provided by the hospital staff)
Question:	What considerations do you make when preparing or choosing food? Can you relate the food's quality and the sugar reading's value?

Data Analysis Techniques

Thematic analysis²² was used by researchers involving 45 photos and 180 transcripts. Each photo and transcript were read back, and voice recordings and notes filed were checked to ensure all information was received and to identify important findings related to the requirements for the content and design of the e-module. Codes have been identified and grouped as main themes and sub-themes and approved by research team members. The photo has been uploaded to Atlas.ti V9, while the transcripts are to a Microsoft Excel Spread sheet.

Figure I shows the six-step process of thematic analysis used in the study, involving triangulation method. The thematic analysis has revealed six main themes and 14 subthemes.

Figure I: Braun and Clarke's (2006) six-step process of thematic analysis was used in the study

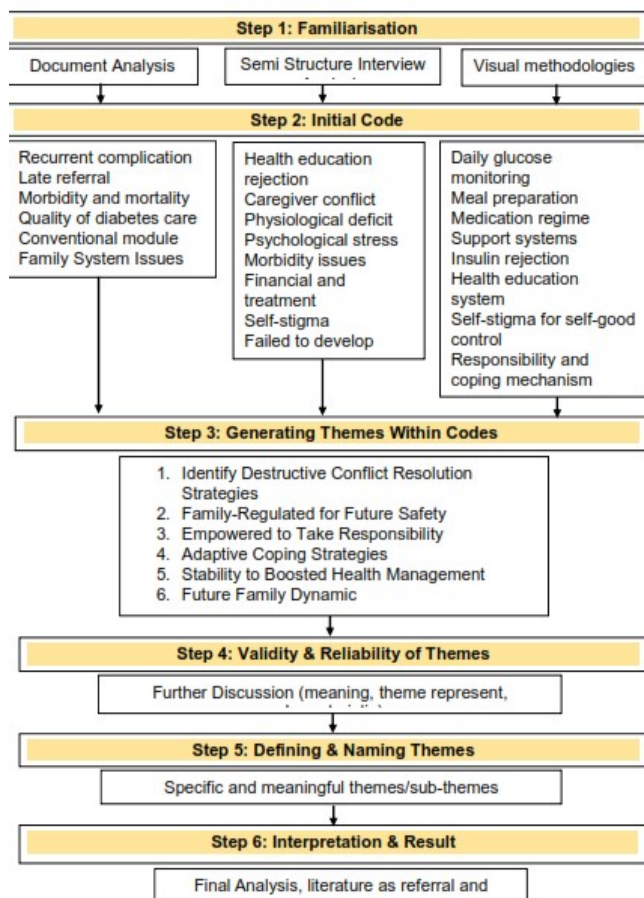


Table II: Respondent Characteristics

Family	Informal Caregivers		T2dm Patient's				
	Age	Relationship	Age	T2dm Duration	HbA1C (%)	Received education before	Diabetic management satisfaction
F1	54	Wife and husband	58	10	12.2	Y	Y
F2	56	Wife and husband	58	11	12.8	Y	Y
F3	26	Son and father	56	10	12	Y	N
F4	47	Wife and husband	49	12	6.3	Y	Y
F5	22	Daughter and father	58	15	13	Y	Y
F6	35	Wife and husband	39	8	12.6	Y	Y
F7	47	Wife and husband	49	10	11	Y	N
F8	55	Husband and wife	50	16	10.3	Y	Y
F9	60	Husband and wife	60	15	9.8	Y	Y
F10	58	Husband and wife	59	10	10.3	Y	Y
F11	57	Wife and husband	59	10	11.6	Y	Y
F12	46	Wife and husband	55	8	12	Y	N
F13	38	Son and father	60	13	13	Y	Y
F14	33	Daughter and father	60	15	7.8	Y	Y
F15	38	Son and father	60	10	9	N	Y

Y= Yes N = NO

Ethical Statement

Ethics approval was obtained before the research was conducted KPJ Healthcare University: KPJUC/RMC/SON/EC/2023/468 and the Medical Research and Ethics Committee, Ministry of Health, Malaysia: (NMRR ID-23-03333-CDI (IIR); Date approved: 09 October 2023).

RESULTS

Respondent Characteristic of Caregivers and T2dm Patient Characteristics (n=30)

A total of 15 families consisting of 15 caregivers and 15 t2dm patients have been involved in the need for an analysis study to form this e-module (**Table II**). **Table II** shows that these 15 families are local people who have lived for more than ten years in Terengganu, Malaysia.

Thematic Analysis Results

Respondents showed positive responses to sharing their experiences. Six main themes have been revealed (**Table III**).

Theme 1: Identify Destructive Conflict Resolution Strategies

Subtheme: Challenges in Managing Diet and Communication

Challenges for the management and dietary intake of diabetes will begin to become a conflict and a burden because of disagreements between them and the health staff. Communication that is too stressful and forceful makes t2dm patients start to get bored and rebel, like rejecting diabetes diet and medication. *'I don't like to be forced, I'm old and experienced, there's no need to teach me' - F14/T*. For caregivers, it is easy to give up and make t2dm patients not comply with their daily diabetes management. *'I don't like being angry, I'm afraid our relationship will be affected*

Table III: Thematic Analysis Results

Theme	Sub-theme
(1) Identify Destructive Conflict Resolution Strategies	- Challenges in Managing Diet and Communication - Self-stigma for self-good control
(2) Family-Regulated For Future Safety	- Integrated Family Eating Preferences - Fear of Hypoglycaemic Symptoms - Challenges in Diet Control with Peer Influences
(3) Empowered To Take Responsibility	- Challenges with Physical Symptoms - Home Glucose Practice
(4) Adaptive Coping Strategies	- Efforts to Achieve Compliance and Responsibility - Health Education Improvement Based on Needs - Decision on Treatment Choice
(5) Stability To Boosted Health Management	- Feeling of Love and Appreciation - Proactive Approach to Health
(6) Future Family Dynamic	- Reflection on Lifestyle Choices Information and Recommendations - Cultivating Responsibility in Family

- F5/C. This situation often happens to caregivers, such as wives, who easily give in and obey the husband's wishes, and the young age factor among caregivers.

Subtheme: Self-Stigma for Self-Good Control

The assumed situation where they are confident in complying with the daily management of t2dm is often shown by t2dm patients when attending follow-up treatment at the health clinic and being admitted to the hospital due to complications such as diabetic ketone acidosis or diabetic neuropathy. These complications cause inflammation and infection in the body tissue. They seem to be graded denial. Their previous practice was correct, but there was a mistake made by the other party. *'I always take medicine as recommended by the doctor'* - F8/T. *'I didn't think my glucose reading was high; when I was at home, my reading was under control'* - F10/T. The caregiver also informed the respondent about this situation. *'Every time my father drinks, I will make sure there is no extra glucose in the drink'* - F15/C.

Theme 2: Family-Regulated for Future Safety

Subtheme: Integrated Family Eating Preferences

Apart from medication management and physical examination, most caregivers and t2dm patients need a food guide that better meets their needs. Some opinions from the caregivers discussed: *'I feel it's easier; the hospital provides guidance in the form of a mobile app'* - F15/C. *'I received a guide pamphlet, but it was left behind when I was first admitted to the ward. It is difficult to refer to it later'* - F4/C, F4/T.

Subtheme: Fear of Hypoglycaemic Symptoms

'I really refused to use insulin injections. I think the doctor doesn't understand my situation' - F6/T. The fear of hypoglycaemia makes t2dm patients prefer to choose dietary control methods or traditional treatment such as homoeopathy medicine. The

situation can give the effect of diabetes therapeutic inertia. *'Father does not inject insulin medicine at home. Various reasons are given'* - F5/C.



Figure II: Visual Methodological: Photo elicitation of insulin pen (a), showing the insulin pen returned with medication that a t2dm patient never used. The patient stated, *'I told the doctor I don't want injectable insulin; the doctor doesn't understand my situation'* - F6/T. (b) Photo elicitation of sugar supply *'I always supply sugar as an emergency kit to my husband'* - F11/C

Subtheme: Challenges in Diet Control with Peer Influences

Although the respondents know what to eat and what not to eat, they do not want to discourage their family members. This situation refers to customs and culture during celebrations and weddings. *'It's not good if you don't celebrate other people's events'* - F8/T. *'If there is a party among family members, I give my husband the opportunity to taste the food of the party'* - F2/C. *'I only take small amounts of food, just to celebrate'* - F9/T.

Theme 3: Empowered to Take Responsibility**Subtheme: Challenges with Physical Symptoms**

Physical changes, such as minor wounds, lethargy, and weight loss, are considered common among caregivers of t2dm patients. This is associated with physical characteristics that are the same for each individual, such as feeling tired and lethargic associated with lack of food, and blurred vision is associated with age factors. *'It's just a small wound, I hope that just applying oil will heal itself' - F13/T. 'I think my father is losing weight as a result of drinking too many sweet drinks' F13/C.* However, some t2dm patients learn from past situations to change, *'I used to go through the same situation, but I immediately got treatment; I don't want to be like other patients' - F7/T.*

Subtheme: Home Glucose Practice

The majority of respondents do not practice glucose testing at home due to various factors, especially financial status and willingness. Home glucose practice can be considered the gold standard for safe practice outside the health area. *'I know the importance of checking glucose at home' - F1/C. 'It's quite difficult for me to make glucose testing at home a daily routine' - F9/T. 'My eyes are blurry to do self-examination at home' - F12/T*

Theme 4: Adaptive Coping Strategies**Subtheme: Efforts to Achieve Compliance and Responsibility**

This theme also makes the topic of study conversation, where respondents try to learn from an incident to change. Researchers were also informed that caregivers and t2dm patients try to learn from the way nutrition is provided in the hospital. *'I see that the hospital provides the right amount of food, and the patient's glucose reading is under control' - F2/C. 'I learned many things when my father was admitted to the ward' - F3/C. 'I am often advised by nurses to control my diet when I leave the ward, I feel energetic' - F12/T.*

Subtheme: Health Education Improvement Based on Needs

The environment and the will that often change lead to the need for necessary health education. Such education must be adapted to the changes and care of chronic diseases such as t2dm. *'I hope there is alternative care other than insulin injections that I can practice' - F6/T. 'Am I at risk of inheriting my father's disease? I often wonder' - F14/C.* Some caregivers provide facilities to obtain health information more accurately and quickly, *'Now in the world of technology, I hope to be able to access health information from the government hospital' - F3/C.*

Subtheme: Decision on Treatment Choice

As family members, t2dm patients expect the support of family members to support every decision made. However, every decision must be accurate because a late decision has delayed the immediate treatment of the patient. This was shared by the caregiver, *'as a child, I can't bear to see my father lose a limb, I try to get alternative treatment' - F15/C.*

Theme 5: Stability to Boosted Health Management**Subtheme: Feeling of Love and Appreciation**

Touch, support, and a sense of belonging are the psychological elements required, as reported by the respondents in the interview session. The researcher was told that as a woman, she is not willing to be seen as different from other women, *'I am very afraid if my husband no longer loves me' - F8/T.* T2dm patients also expect that everyday diabetes management is considered a significant change by other family members. *'I often feel depressed, so I don't eat and experience hypoglycaemic attacks after taking medicine' - F10/T.*

Subtheme: Proactive Approach to Health

'As a husband, I have to fulfil my responsibilities to my wife' - F9/C. 'I try not to be easily influenced by invalid recommendations and treatments' - F4/T. This statement is a step towards building a better health strategy.



Figure III: Visual Methodological: (a) Photo elicitation shows the glucose examination performed by a nurse on a t2dm patient. (b) The quantity and quality of nutrition needed for balanced glucose control. The caregiver quote, *'Oh, this is the right amount of food...I can prepare it for the patient later when I'm at home' - F7/C*

Theme 6: Future Family Dynamic**Subtheme: Reflection on Lifestyle Choices Information and Recommendations**

Some respondents gave an optimistic view through reflection on the effects of their previous choices. Among the positive points of view are taken into account to ensure that there is no history of complications among their family members. *'I hope my children take care of their health and nutrition' - F10/T. 'After this, my family and I will choose a healthy lifestyle. I'm tired of the current situation' - F4/T.* The option to stay healthy is also chosen because they want to feel appreciated and owned by their family members.

Subtheme: Cultivating Responsibility in Family

Sharing views and opinions and spending time together is an approach that respondents very much need through two-way interaction. A good interaction relationship can form a family dynamic towards the quality of a healthier world society, *'I know the history of diabetes in the family is very strong. My father often tells me to take care of my health' - F14/C. 'Every problem I face, I will try to solve. I don't want problems to increase and feel burdened' - F8/C.*

DISCUSSION

This needs analysis approach study makes novel contributions to the literature by describing the domain for the daily management of t2dm aimed at designing an interdependent e-module. Through this method, the discovery of an evidence-based framework concept can be implemented more accurately and comprehensively to ensure that every requirement is met and understood²⁷.

Throughout this study, caregivers and t2dm patients responded very positively and contributed to the discussion. However, some sensitive issues arise, such as agreement in forming weak responsibilities between them, and one of the factors is conflict and increased burden²⁸. Respondents also frequently discuss and agree that dietary modification is significant and should be highlighted in various ways to obtain better glucose control²⁹. This emphasis is essential when failure to control a balanced diet can trigger various significant complications that are worse, such as heart diseases, retinopathy, and nephropathy.

Lastly, caregiver respondents hope that there will be a health education system that is easier to use in the future, such as facilities and modules. In today's era, busy work puts pressure on communication related to daily health. Although they frequently contact each other regarding health during treatment or after returning from the health clinic, this cannot be adapted to joint action between them. Caregivers sharing a perspective in providing better treatment will give a sense of belonging, and being appreciated among t2dm patients should also be emphasised.

The evidence-based triangulation approach in this study has provided much information in terms of conflict, responsibility, and coping strategies that need to be formed by them. Therefore, a needs analysis approach framework such as this study has been conducted to identify more deeply what intervention reforms can be built and not be biased between the caregiver and t2dm patient. Each theme and subtheme has been generalised to an interdependent module for the next phase of the study.

LIMITATION OF STUDY

There are some limitations to getting two different opinions between informal caregivers and T2DM patients. Confounding factors such as the severity of T2DM disease, the condition of the care information recipient, and family relationship issues may need to be considered in future research.

CONCLUSION

Overall, the findings of this study have provided renewal and information on the need to replace the conventional module with an interdependent e-module. This need analysis study is a validation and assessment conducted on t2dm patients and caregivers, taking into account the patient's clinical

documents as evidence-based. The study of designing an interdependent e-module for t2dm management will provide positive implications through contributions to the t2dm health education system, such as expanding the body of knowledge of the health system in the family. An improved family health system provides a million benefits, especially the burden on the treatment of complications and treatment costs.

ACKNOWLEDGEMENT

The research reported in this publication was supported by KPJ Healthcare University: KPJUC/RMC/SON/EC/2023/468 and the Medical Research and Ethics Committee, Ministry of Health, Malaysia: (NMRR ID-23-03333-CDI (IIR)).

Ethical Permission: KPJ Healthcare University, Malaysia ERC letter No. KPJUC/RMC/SON/EC/2023/468 and the Medical Research and Ethics Committee, Ministry of Health, Malaysia letter No. NMRR ID-23-03333-CDI (IIR).

Conflict of Interest: No conflicts of interest, as stated by authors.

Financial Disclosure / Grant Approval: This research was supported in part with funding from KPJ Healthcare University: KPJUC/RMC/SON/EC/2023/468.

Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publicly.

AUTHOR CONTRIBUTION

Mizwar TM: Conceived, designed study, analysed data, contributed to data interpretation.

Yusof P: Made revisions

Ahmad A: Contributed to data interpretation, made revisions.

All authors read and approved the final manuscript.

REFERENCES

1. Jeffries PR, Bushardt RL, DuBose-Morris R, Hood C, Kardong-Edgren S, Pintz C, Posey L, Sikka N. The role of technology in health professions education during the COVID-19 pandemic. *Acad Med.* 2022; 97(3S): S104-9.
2. Sze WT, Kow SG. Perspectives and Needs of Malaysian Patients with Diabetes for a Mobile Health App Support on Self-Management of Diabetes: Qualitative Study. *JMIR Diabetes.* 2023; 8: e40968.
3. Akhtar S, Nasir JA, Ali A, Asghar M, Majeed R, Sarwar A. Prevalence of type-2 diabetes and prediabetes in Malaysia: A systematic review and meta-analysis. *PloS One.* 2022; 17(1): e0263139.
4. Jazayeri E, Kazemipour S, Hosseini SR, Radfar M. Quality of life in the elderly: A community study. *Caspian J Intern Med.* 2023; 14(3): 534.
5. Fadzil MM, Akmal MH, Wong YY, Neoh CF, Lean

- QY. Self-Management Knowledge Among Patients with Type 2 Diabetes Mellitus in Hospital Taiping, Malaysia. *Malaysian J Pharmaceut Sci*. 2022; 20(1): 85-99.
6. Shaban MM, Sharaa HM, Amer FG, Shaban M. Effect of digital based nursing intervention on knowledge of self-care behaviors and self-efficacy of adult clients with diabetes. *BMC Nursing*. 2024; 23(1): 130.
 7. Erdoğan P, Güler G. Needs Analysis in Program Development. *Int J Human Soc Sci Invent*. 2017.
 8. McKillip J. Need analysis: Tools for the human service and education. *Appl Soc Res Methods Ser*. 1987.
 9. Sowah RA, Bampoe-Addo AA, Armoo SK, Saalia FK, Gatsi F, Sarkodie-Mensah B. Design and development of diabetes management system using machine learning. *International journal of telemedicine and applications*. 2020; 2020(1): 8870141.
 10. Nababan T, Saragih E. Designing training module to improve nursing clinical competence based on needs analysis: A developmental study. *Asian J. Sci. Res*. 2018; 11(3).
 11. Lamonge AS, Baua ME. Development and evaluation of web-based Self-care Management Health Education e-Learning Program for type 2 diabetes patients: A pilot study. *Enfermería Clínica*. 2023; 33: S27-32.
 12. Van Eck RN, Gullett HL, Lamb SM, Krouse HJ, Mazzurco LW, Lage OG, Lewis JH, Lomis KD. The power of interdependence: linking health systems, communities, and health professions educational programs to better meet the needs of patients and populations. *Medical Teacher*. 2021; 43(sup2): S32-8.
 13. Rasool HA, Al Bajalani FR. Using qualitative methods as a needs analysis for developing a creative writing course: a thematic analysis. *Zanco J Human Sci*. 2021; 25(5): 322-34.
 14. Creswell JW, Creswell JD. *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications; 2017 Dec 12.
 15. Harper D. Talking about pictures: A case for photo elicitation. *Visual studies*. 2002; 17(1): 13-26.
 16. Wang C, Burris MA. Photovoice: Concept, methodology, and use for participatory needs assessment. *Health Educ Behav*. 1997; 24(3): 369-87.
 17. Fritz H, Lysack C. "I see it now": Using photo elicitation to understand chronic illness self-management: L'usage de la méthode de photo-interview pour mieux comprendre l'autogestion des maladies chroniques. *Canadian Journal of Occupational Therapy*. 2014 Oct;81(4):247-55.38.
 18. Scavarda A, Costa G, Beccaria F. Using Photovoice to understand physical and social living environment influence on adherence to diabetes. *Health*. 2023; 27(2): 279-300.
 19. Altman DG. *Practical statistics for medical research*. Chapman and Hall/CRC; 1990 Nov 22.
 20. Bowen GA. Document analysis as a qualitative research method. *Qualitative research journal*. 2009; 9(2): 27-40.
 21. Dalglish SL, Khalid H, McMahon SA. Document analysis in health policy research: the READ approach. *Health policy and planning*. 2020; 35(10): 1424-31.
 22. Danner A, Oconnor M, Whitehouse C. 613-P: The Needs of Caregivers for Recently Hospitalised Older Adults with Type 2 Diabetes Mellitus. *Diabetes*. 2020; 69(Supplement_1).
 23. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative research in psychology*. 2006; 3(2): 77-101.
 24. Ruslin R, Mashuri S, Rasak MS, Alhabsyi F, Syam H. Semi-structured Interview: A methodological reflection on the development of a qualitative research instrument in educational studies. *IOSR J Res Method Educ*. 2022; 12(1): 22-9.
 25. Basil M. Use of photography and video in observational research. *Qualitative Market Research J*. 2011; 14(3): 246-57.
 26. Glaw X, Inder K, Kable A, Hazelton M. Visual methodologies in qualitative research: Autophotography and photo elicitation applied to mental health research. *Int J Qualitative Methods*. 2017; 16(1): 1609406917748215.
 27. Radley A. What people do with pictures. *Visual Studies*. 2010; 25(3): 268-79.
 28. Robertson AR, Fernando B, Morrison Z, Kalra D, Sheikh A. Structuring and coding in health care records: a qualitative analysis using diabetes as a case study. *J Innov Health Inform*. 2014; 22(2): 275-83.
 29. Kristaningrum ND, Ramadhani DA, Hayati YS, Setyoadi. Correlation between the burden of family caregivers and health status of people with diabetes mellitus. *J Public Health Res*. 2021; 10(2): jphr-2021.
 30. Garcia-Molina L, Lewis-Mikhael AM, Riquelme-Gallego B, Cano-Ibanez N, Oliveras-Lopez MJ, Bueno-Cavanillas A. Improving type 2 diabetes mellitus glycaemic control through lifestyle modification implementing diet intervention: a systematic review and meta-analysis. *Eur J Nutr*. 2020; 59(4): 1313-28.

